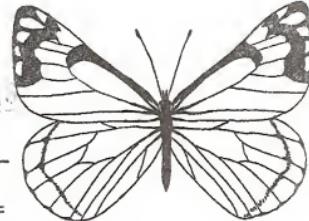


S
595.7

77- MONTANA DEPARTMENT OF NATURAL
RESOURCES AND CONSERVATION

DIVISION OF FORESTRY

INSECT AND DISEASE REPORT



Missoula, Montana 59801
Report 77-1

Montana State Library


3 0864 1006 4762 0

942.49
February 1977

GROUND APPLICATION OF FOUR INSECTICIDES
ON DOUGLASFIR TUSsock MOTH AND
WESTERN SPRUCE BUDWORM POPULATIONS IN MONTANA

By

Steve Kohler, Entomologist
Cooperative Forest Management
Division of Forestry

SUMMARY

Four insecticides (Sevin, Orthene, Pyrocide Growers Spray and Dimilin) were tested against Douglasfir tussock moth larvae, Orgyia pseudotsugata (McDunnough), and western spruce budworm larvae, Choristoneura occidentalis Freeman, on Douglasfir near St. Ignatius, Montana, in June, 1976. Hydraulic spray equipment was used to treat four groups of five trees each. All treatments were highly successful, with corrected percent control of 100 for Douglasfir tussock moth and from 86 to 100 for western spruce budworm.



INTRODUCTION

The importance of damage to western forests by outbreaks of Douglas-fir tussock moth, Orgyia pseudotsugata (McDunnough) and western spruce budworm, Choristoneura occidentalis Freeman, has been well documented (Tunnock, 1973; Johnson and Denton, 1975). Loss of or damage to high-value trees in homeowner's yards, trailer courts, cemeteries, camp and picnic grounds, etc., need not be tolerated. The objectives of this test were:

1. To test and compare the effectiveness of ground applications of four chemical insecticides in reducing Douglasfir tussock moth and western spruce budworm larval populations on individual trees.
2. To provide data for registration by the manufacturer of one or more chemical insecticides which may be used by homeowners and land managers to protect individual high-value trees under attack by Douglasfir tussock moth or western spruce budworm.

MATERIALS AND FORMULATION

After consultation with the USDA Douglasfir Tussock Moth Research and Development Program, the USDA Forest Service Insecticide Evaluation Project, and the USDA Forest Service Methods Application Group, the following materials and formulations were selected from several candidates:

Sevin (carbaryl) - Sevin 50W (50 percent wettable powder) was provided by Union Carbide Corporation and was applied at a dosage rate of 1 pound a.i. per 100 gallons of water.

Orthene - Orthene 75S (75 percent soluble powder) was provided by Chevron Chemical Company and was applied at a dosage rate of .5 pound a.i. per 100 gallons of water.

Stabilized Pyrethrins - Pyrocide Growers Spray 7083 (1.4 percent liquid concentrate) was provided by McLaughlin Gormley King Company and was applied at a dosage rate of .1 pound a.i. per 100 gallons of water.

Dimilin - Dimilin W-25 (T-H 6040) (25 percent wettable powder) was provided by Thompson Hayward Chemical Company and was applied at a dosage rate of 2 ounces a.i. per 100 gallons of water.

TEST DESIGN

Each treatment, including the check, consisted of one open-grown Douglasfir tree 20-50 feet tall. The treatments were replicated five times, so that a group of five trees was treated with each of

the four insecticides and a group of five trees served as checks. Tree groups were separated sufficiently to minimize spray drift between groups. Insecticides were applied June 25, 1976. Application was timed so that Douglasfir tussock moth egg hatch was completed and the larvae had migrated to the foliage and begun feeding. Larval development for the two species on the day previous to spraying was as follows:

Douglasfir Tussock Moth

| <u>Larval Instar</u> | <u>Percent</u> |
|----------------------|----------------|
| First | 84 |
| Second | 16 |

Western Spruce Budworm

| <u>Larval Instar</u> | <u>Percent</u> |
|----------------------|----------------|
| Second | 4 |
| Third | 14 |
| Fourth | 26 |
| Fifth | 29 |
| Sixth | 27 |

Larval populations were sampled the day before spraying and 4 days after treatment with Orthene and Pyrocide Growers Spray, 4 and 8 days after treatment with Sevin, and 8 and 14 days after treatment with Dimilin. Larval populations for each period were sampled by clipping eight 15-inch branches from mid-crown of each treatment tree with an extendable pole pruner equipped with catch basket. Larvae on the sample branches were counted in the field and expressed as number per 1,000 square inches of foliage. Four categories of larvae were recorded: (1) Douglasfir tussock moth, (2) western spruce budworm, (3) sawflies (*Neodiprion* sp.), and (4) other lepidopterous larvae (mainly Geometridae and *Dioryctria* sp.)

Spray was applied using a Division of Forestry fire pumper equipped with a 200 gallon fiberglass tank and a centrifugal four-stage WGC-4-SP Pacific pump. The nozzle used was an Elkhart Select-O-Flow, adjustable from 10 to 30 gallons flow per minute. All sprays were applied to the point of run-off. An average of 5 to 10 gallons of spray was applied per tree.

RESULTS

Test results were highly successful and indicated that any of the four materials would be suitable for control of Douglasfir tussock

moth or western spruce budworm on high-value trees by private homeowners and land managers. Although the test sprays were applied with equipment that developed up to 200 p.s.i. pressure and was capable of reaching to heights of 50 feet and more, any of a variety of conventional sprayers available to private landowners would be sufficient to apply the material. The important consideration with non-persistent sprays is to insure that the entire tree crown is fully covered.

Results of the tests are summarized in the following tables:

Douglasfir Tussock Moth

| Treatment | Prespray Density ^{1/} | Postspray Density ^{1/} | | | Percent Reduction ^{2/} | | |
|-----------|--------------------------------|---------------------------------|-------|--------|---------------------------------|-------|--------|
| | | 4 day | 8 day | 14 day | 4 day | 8 day | 14 day |
| Check | 3.62 | 3.39 | 3.34 | 2.73 | 6 | 8 | 25 |
| Sevin | 7.99 | 0.32 | 0.00 | --- | 96 | 100 | --- |
| Orthene | 6.79 | 0.00 | --- | --- | 100 | --- | --- |
| Pyrocide | 7.83 | 0.00 | --- | --- | 100 | --- | --- |
| Dimilin | 5.03 | --- | 0.60 | 0.00 | --- | 87 | 100 |

Western Spruce Budworm

| Treatment | Prespray Density ^{1/} | Postspray Density ^{1/} | | | Percent Reduction ^{2/} | | |
|-----------|--------------------------------|---------------------------------|-------|--------|---------------------------------|-------|--------|
| | | 4 day | 8 day | 14 day | 4 day | 8 day | 14 day |
| Check | 21.15 | 18.19 | 22.18 | 16.70 | 14 | 0 | 21 |
| Sevin | 23.72 | 0.95 | 0.31 | --- | 95 | 99 | --- |
| Orthene | 12.73 | 0.00 | --- | --- | 100 | --- | --- |
| Pyrocide | 6.71 | 0.28 | --- | --- | 95 | --- | --- |
| Dimilin | 17.06 | --- | 7.79 | 1.90 | --- | 62 | 86 |

1/ Larvae per 1000 in.² foliage surface.

2/ Percent control was corrected according to Abbott's formula.

Sawflies (Neodiprion sp.)

| Treatment | Prespray Density ^{1/} | Postspray Density ^{1/} | | | Percent Reduction ^{2/} | | |
|-----------|-----------------------------------|---------------------------------|-------|--------|---------------------------------|-------|--------|
| | | 4 day | 8 day | 14 day | 4 day | 8 day | 14 day |
| Check | 3.90 | 5.55 | 2.13 | 1.82 | 0 | 45 | 53 |
| Sevin | 3.73 | 0.00 | --- | --- | 100 | --- | --- |
| Orthene | 6.23 | 0.00 | --- | --- | 100 | --- | --- |
| Pyrocide | 19.58 | 0.00 | --- | --- | 100 | --- | --- |
| Dimilin | 16.78 | --- | 2.10 | 0.00 | --- | 76 | 100 |

Other lepidopterous larvae (Chiefly Geometridae and Dioryctria sp.)

| Treatment | Prespray Density ^{1/} | Postspray Density ^{1/} | | | Percent Reduction ^{2/} | | |
|-----------|-----------------------------------|---------------------------------|-------|--------|---------------------------------|-------|--------|
| | | 4 day | 8 day | 14 day | 4 day | 8 day | 14 day |
| Check | 3.62 | 2.77 | 4.56 | 3.64 | 23 | 0 | 0 |
| Sevin | 2.13 | 0.32 | 0.31 | --- | 81 | 85 | --- |
| Orthene | 1.98 | 0.31 | --- | --- | 80 | --- | --- |
| Pyrocide | 1.12 | 0.00 | --- | --- | 100 | --- | --- |
| Dimilin | 0.84 | --- | 1.20 | 0.00 | --- | 0 | 100 |

1/ Larvae per 1000 in.² foliage surface.

2/ Percent control was corrected according to Abbott's formula.

REFERENCES

Johnson, P. C., and R. E. Denton, 1975. Outbreaks of the western budworm in the American Northern Rocky Mountain area from 1922 through 1971. USDA Forest Service, Gen. Tech. Rep. INT-20.

Tunnock, S. 1973. The Douglasfir tussock moth in the Northern Region a cartographic history of outbreaks from 1928 to 1973. USDA Forest Service, Northern Region, Division of State and Private Forestry, Rept. No. 73-27.

Test materials were contributed by the following companies:

Chevron Chemical Company
McLaughlin Gormley King Company
Thompson Hayward Chemical Company
Union Carbide Corporation

The work leading to this publication was funded in part by a U. S. Department of Agriculture sponsored program titled "Expanded Douglasfir Tussock Moth Research and Development Program".

